MICROVOX TEXT TO SPEECH SYNTHESIZER

ASSEMBLY INSTRUCTIONS

THE MICROMINT INC. 561 Willow Avenue, Cedarhurst, N.Y. 11516

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Assembling the MicroVox Text to Speech Synthesizer

The MICROMINT has made every effort to produce a quality kit. It must be realized however, that the difference between the price of an assembled and tested unit and a kit of components is substantial. The difference accounts for the equipment and labor involved with assembly, testing and burnin. This is not a novice project and the directions assume that you have some experience building electronic projects and have test equipment available to you to trouble shoot problems if any arise. The MICROMINT uses only prime components and devices such as the SC-01A and the EPROMS are tested before shipment.

NOTE: This kit contains approximately 100 components. While all components could be randomly inserted and soldered, the preferred procedure is to insert and solder the components in stages.

STEP 1 --- Insert and solder all resistors except R11 and SIP1. The best procedure is to find the location of each resistor on the board and then insert the correct component value as listed in the Parts List. The color code of each resistor is also provided as an aid. Be careful that two resistors, R19 and R20, are larger 1/2 W resistors while the others are 1/4 W.

STEP 2 --- Insert and solder the 19 IC sockets. Note that pin 1 on each socket is designated on the board by a dot next to that pin. The notch on the end of the socket should also line up with the layout shown on the silkscreen. Since the socket covers the IC number on the silkscreen, refer to the attached component diagram for proper orientation. DO NOT INSTALL ANY ICs AT THIS TIME (None of the IC's should be removed from the shipping foam unless they are to be immediately installed in the board).

STEP 3 --- Insert and solder all capacitors. The electrolytic capacitors are tubular. They have the negative side of the capacitor designated usually with a minus sign and arrows pointing in that direction. The opposite side is positive. When inserting these components into the board the positive lead of the capacitor should be inserted into the pad with the "+" mark. Note, unlike the ICs, the "+" sides of the capacitors aren't all in the same direction.

The ceramic capacitors are generally circular. Note that C1 is 0.01 Mfd. Do not mix it with the others or the board will not function properly. C11 is a circular trim capacitor.

STEP 4 --- Install crystal X1. It should be soldered such that it stands upright about 1/8" above the board. Don't bend the leads too much. They break easily.

STEP 5 --- Insert and solder SIP1, D1, D2, Z1, and Z2. SIP1 is a 10 lead resistor pack which has a dot on one end to indicate the common. When inserted, this dot should line up with the dot etched on the PC board and be toward IC14.

D2 is a full wave bridge rectifier with "+" and "-" indicated on the side. When inserted, these leads should go in the holes silkscreened with those polarities.

D1, Z1, and Z2 have a colored band on one edge to indicate the cathode lead or "bar" side of the device. When inserting these components, orient the bar to line up with that pictured on the silkscreen.

STEP 6 --- Insert and solder the two 8 position DIP switches SW1 and SW2. (In the case of SW2, a 2 by 9 BERG header may be supplied instead. It is inserted in the two rows of holes on the left side of the retangular pattern drawn in the silkscreen under the words "DATA RATE". A separate jumper bar is used to actuate the 1 of 9 position switch action). Both DIP switches should be inserted with the position 1 switch oriented in the same direction as pin 1 on the IC sockets (ie., if the RS-232 and parallel conectors are thought of as the top of the board, then switch 1 is toward the top of the board.

STEP 7 --- Insert and solder connectors J1 (DB-25S, RS-232) and J2 (ear phone/ ext speaker jack) and the 2 by 3 pin header between J1 and IC3.

STEP 8 --- Insert the 6-32 3/8" screw through the mounting hole on V1 from the bottom of the board and hold it with your finger. Next, lay the 6072 heatsink between C18 and C19 over the screw then, the 7805 (V1) regulator with its label side up. The three leads of V1 should be bent at right angles and push through the holes labeled 1, 2, and 3. Finally, lay the 6071 heatsink over the same screw so that it surrounds V1. Add the 6-32 nut, tighten and solder V1.

STEP 9 --- Wire and insert potentiometer R11. Attach three wires, approximately 3" in length, to the three adjacent leads of R11. Attach two (or a twisted pair) 8" leads to the switch connections on the bottom of the pot. The three volume control leads are inserted in the holes under the word "VOLUME" on the silkscreen. Temporarily invert the pot while you do this so that the three leads line up with the three holes (it's necessary to turn the pot 180 degrees to make it fit with the face plate). The 8" leads are soldered into two holes labeled "POWER SWITCH" next to V1. Rotate the shaft of R11 fully counter clockwise so that it is in the off position.

STEP 10 --- Attach the LED and transformer. The LED inserts in the two holes next to the heatsink for V1. For the time being, insert the LED such that it sticks above the board at its maximum height (about 1 1/2"). Carefully apply the MicroVox front decal to the face plate (Note: Some face plates may be silk screened instead of having a separate decal). Install the face plate and bend the LED at a right angle so that it protrudes through the hole provided for it (make sure that the two leads don't touch each other or the heatsink). The pot (R11) can also be inserted and bolted on at this time to keep it from flopping around. Place the serrated washer on the inside to keep from tearing the decal. The back plate and knob can be installed at any time.

The transformer has three leads which are inserted on the left side of the board under 22VCT. Two of the leads are labeled AC and one is CT. The AC leads are generally black and white or black and green. The CT lead is generally red. If you have any doubts, you can verify the proper leads with an AC voltmeter. With the transformer plugged in, you should look for two leads which each read about 11 VAC referenced to the third lead (improper connection will read 22 VAC). The two leads which indicate 11 volts are the AC connections and the reference lead is CT (center tap). Slip the grommet over the transformer cable and make these conections to the board with the transformer unplugged.

STEP 11 --- Without any ICs installed, power up the board by plugging in the transformer and rotating the pot switch (R11) clockwise. The LED should light (this is generally an adaquate test but you may want to reassure yourself a little by measuring a few voltages before plugging in $120 worth of chips). Using a DC voltmeter, attach one lead to the negative side of C18 (circuit ground). With the other lead you should observe the following: +5 volts at IC18 pin 14; +12 volts at IC 17 pin 14; and, -12 volts at IC17 pin 1. If you do not observe these readings look for a solder short, or recheck the transformer connections and the polarities of Z1, Z2, D1, and D2.

Step 12 --- If no shorts exist and everything else checks out OK, turn off the power, unplug the transformer and insert all the ICs except the SC-01A (IC12). (Take special care when inserting them. Some are static sensitive.) The indentation or notch on the case of the IC indicates pin 1 and should line up with silk screened layout on the board.

There are two 2732 EPROMS (one should be labeled E000 or HIGH and the other C000 or LOW) and one 2016 RAM among the ICs. The 2016 should be inserted in location IC2. IC3 is for an optional 2016 input buffer expander (requires different EPROM chips than those supplied) and should be left empty. The two EPROMS should be installed in IC4 (HIGH) and IC5 (LOW). These sockets are 28 pins and the EPROMS are 24 pins. The EPROMS should be inserted in the lower 24 pins of the 28 pin socket (pins 1, 2, 27, and 28 should be empty).

STEP 13 --- Jumper installation. While there are various jumper options on the MicroVox board, many such as memory type and clock rate are already set for this application with a PC trace. SW1, SW2 and the 2 by 3 header should be set to specific default conditions for testing. These settings are described in detail in the MicroVox User's Manual. For testing purposes however, just set the following: SW1 positions 1-6 open, position 7 and 8 closed; SW2 position 2 closed all the rest open; and, 2 jumpers should be placed in the DCE positions of the 2 by 3 communication line switching header behind J1.(If you are using a CRT terminal to check your MicroVox, you can get a full duplex character echo from the MicroVox by placing the two jumpers on the same side of the header (ie., one DTE and one DCE).

STEP 14 --- Testing and Checkout. Attach an 8 Ohm speaker to a mini-plug (not supplied) and plug it into J2. If you have no plug, you can attach the speaker to the two pads to the left of J2 labeled "INT SPKR". When an external speaker is plugged into J2 it will shut off this internal speaker. With the pot switched off, plug in the MicroVox. Turn on the pot switch and the volume. Since no SC-01A is in the circuit, nothing should be heard. You might check voltages again just to make sure there are no power problems. If everything is OK, unplug the transformer (don't just shut off the pot switch) and carefully insert the SC-01A (IC12).

Testing the proper operation of the MicroVox board is simply a go/no-go test and consists of plugging it in. With the pot switched off, plug in the MicroVox. Turn on the pot switch and the volume. The MicroVox should say "READY". If it says ready, proceed to the User's Manual and exercise the different control modes.

If it doesn't say "READY", turn off the power immediately and check for proper insertion of the ICs again. Unfortunately, aside from exchanging and testing each of the individual ICs, there are no diagnostic tests that can be performed. "READY" being voiced is a test of the speech section and exercises all portions of the circuit except the serial and parallel input ports. The software cannot work without an operational SC-01A installed (even those functions not dealing with speech).

Help From the Factory

Given the fact that the kit MicroVox is user assembled, the MICROMINT cannot extend the same warranty as factory assembled and tested units. The MICROMINT makes no guarantee on user assembled systems except that the components are functional. The MICROMINT will replace any defective components which are not defective as the result of user neglect.

If you are unable to get your MicroVox to operate, the MICROMINT offers a factory inspection and repair service. The charge is $35 per hour (minimum one hour prepaid in advance) plus parts. Before anything is returned for repair an authorization sticker must be obtained from MICROMINT. This can be obtained by calling the business office at (516) 374-6793. If the repair exceeds $35 you will be notified before the repair is done.

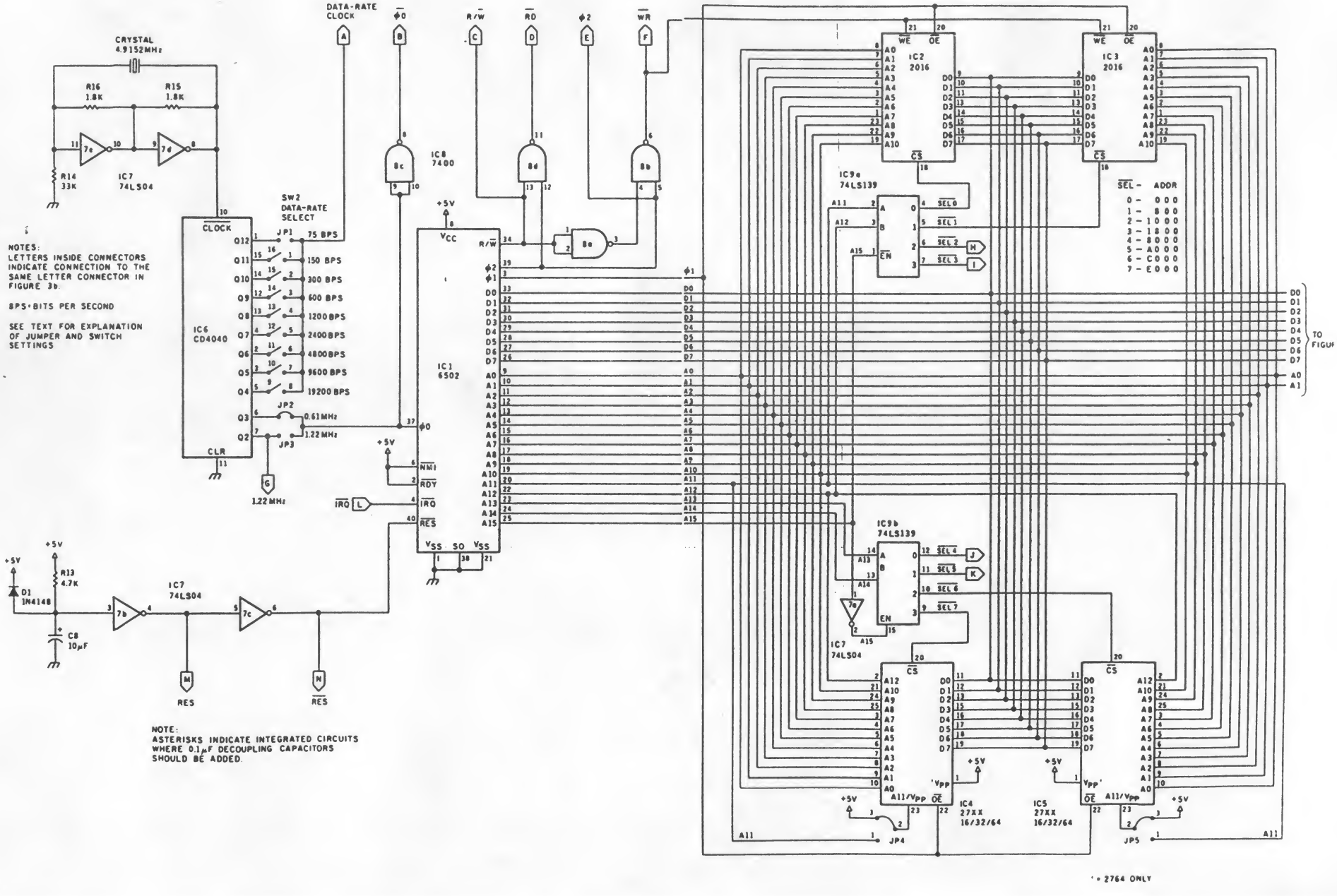
MICROVOX PARTS LIST

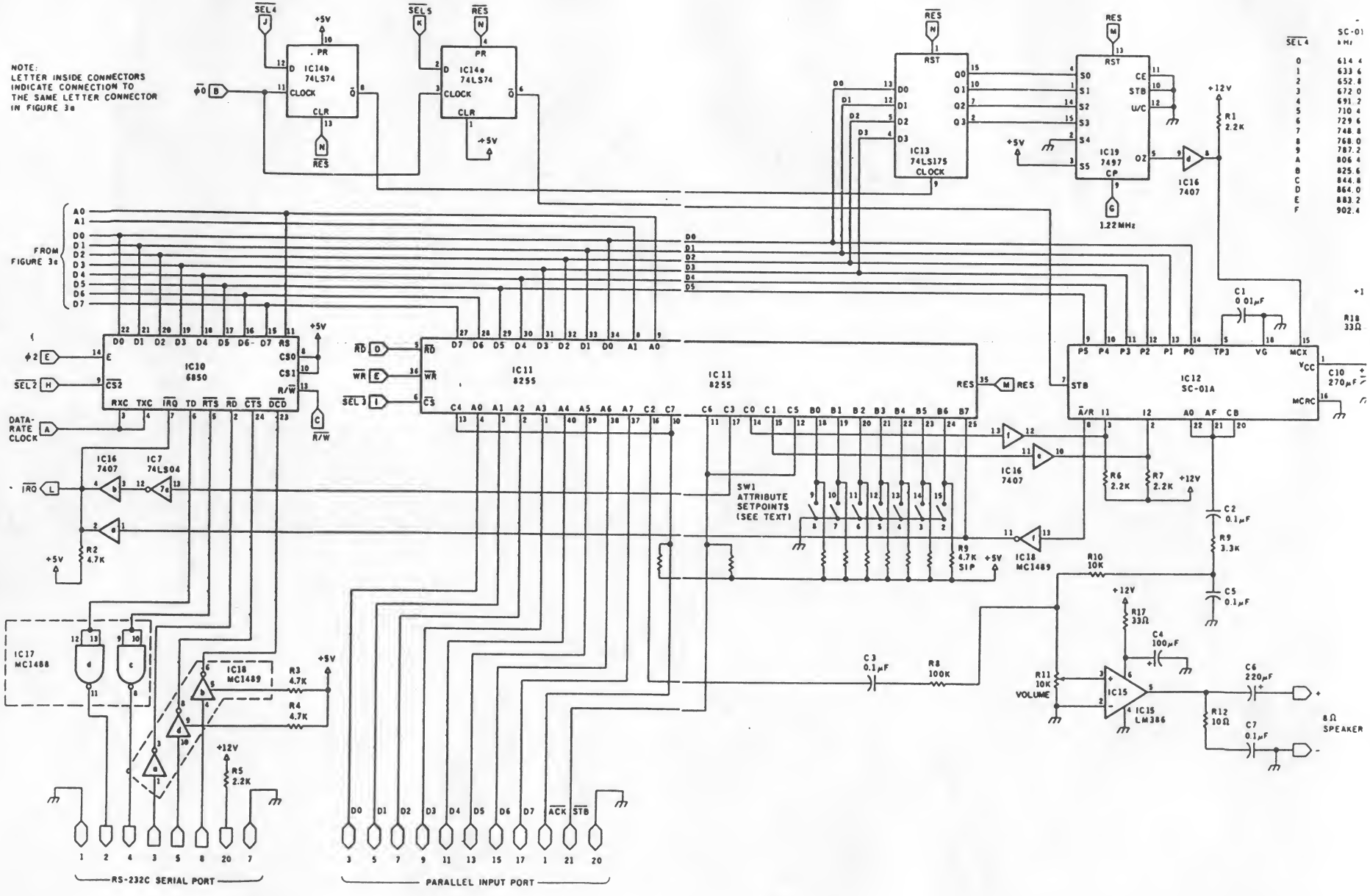
C1	0.01 Mfd 16V Ceramic Disc
C2	0.1 Mfd 16V Ceramic Disc
C3	0.1 Mfd 16V Ceramic Disc
C4	100 Mfd 25V Electrolytic
C5	0.1 Mfd 16V Ceramic Disc
C6	220 Mfd 25V Electrolytic
C7	0.1 Mfd 16V Ceramic Disc
C8	10 Mfd 25V Electrolytic
C9	n/a
C10	220 Mfd 25V Electrolytic
C11	0.1 Mfd 16V Ceramic Disc
C12	0.1 Mfd 16V Ceramic Disc
C13	0.1 Mfd 16V Ceramic Disc
C14	0.1 Mfd 16V Ceramic Disc
C15	0.1 Mfd 16V Ceramic Disc
C16	0.1 Mfd 16V Ceramic Disc
C17	0.1 Mfd 16V Ceramic Disc
C18	2200 Mfd 25V Electrolytic
C19	470 Mfd 25V Electrolytic
C20	10 Mfd 25V Electrolytic
C21	10 Mfd 25V Electrolytic
C22	10 Mfd 25V Electrolytic
D1	1N4148
D2	KBP02 Bridge or equivalent
ZD1	1N4742A
ZD2	1N4742A
IC1	6502 Microprocessor
IC2	2016 1K X 8 RAM
IC3	2016 1K X 8 RAM (optional)
IC4	2732 EPROM (programmed)
IC5	2732 EPROM (programmed)
IC6	CD4040
IC7	74LS04
IC8	74LS00
IC9	74LS139
IC10	6850 UART
IC11	INS8255 PIO
IC12	SC-01A Phoneme Synthesizer
IC13	74LS175
IC14	74LS74
IC15	LM386 AMP
IC16	7407
IC17	MC1488
IC18	MC1489
IC19	7497
LED1	TIL 220, RED
R1	2.2K (RED RED RED)
R2	4.7K (YEL VIO RED)
R3	4.7K
R4	4.7K
R5	2.2K
R6	2.2K
R7	2.2K
R8	470K (YEL VIO YEL)

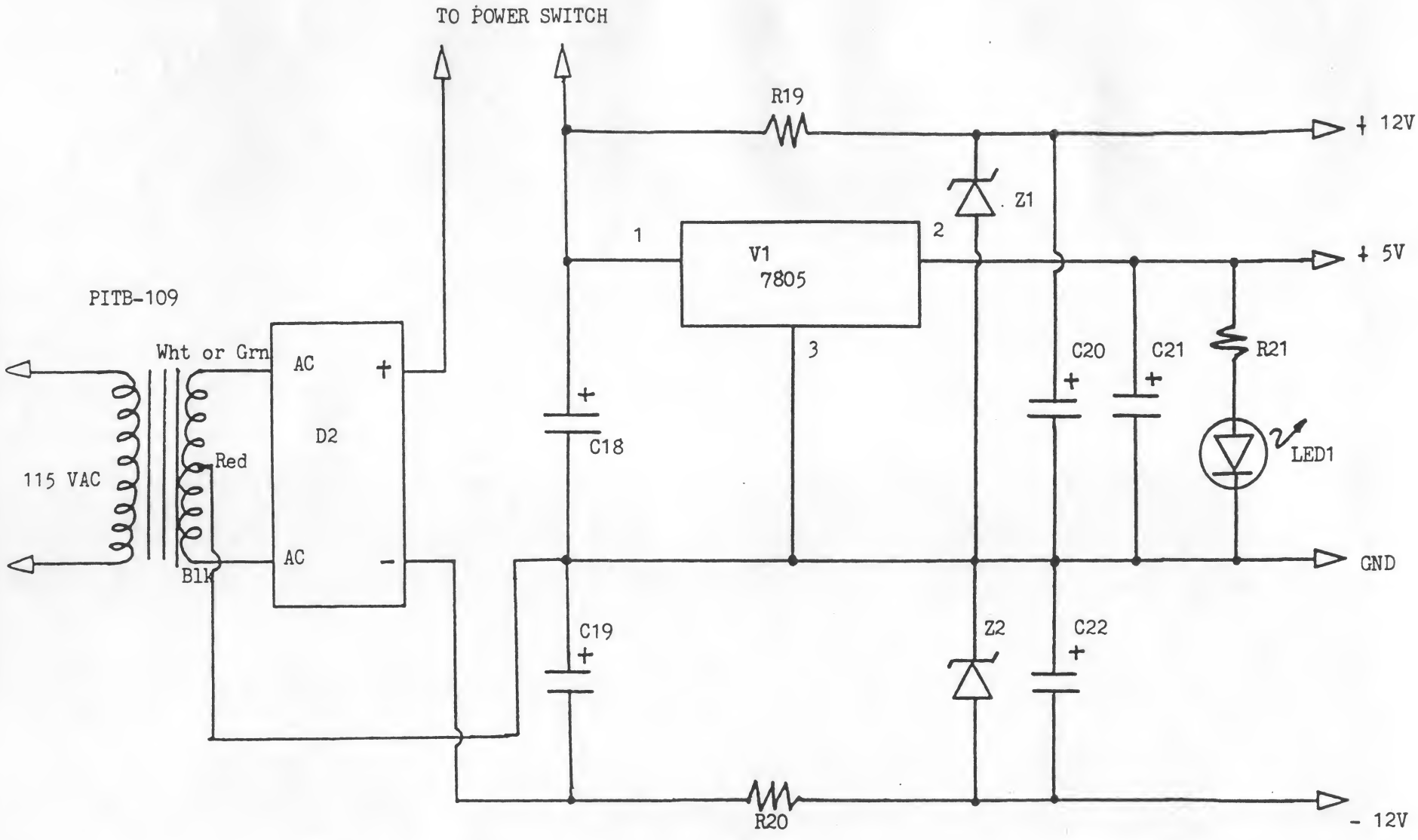
R9 ✓ 3.3K (ORG ORG RED)
R10 ✓ 10K (BRN BLK ORG)
R11 10K POT W/SWITCH
R12 ✓ 10 OHM (BRN BLK BLK)
R13 ✓ 4.7K
R14 ✓ 33K (ORG ORG ORG)
R15 ✓ 1.8K (BRN GRY RED)
R16 ✓ 1.8K
R17 ✓ 33 OHM (ORG ORG BLK)
R18 ✓ 10 OHM (BRN BLK BLK)
R19 ✓ 33 OHM 1/2 W
R20 ✓ 100 OHM 1/2 W (BRN BLK BRN)
R21 ✓ 470 OHM (GRN VIO BRN)
S1 8 POS DIP SW
S2 8 POS DIP SW (or 2 X 9 Berg header)
SIP1 4.7K, 10 pin Resistor SIP
V1 MC7805 Regulator
X1 Crystal 4.9152 Mhz
Micromint Text to Speech PC Board
Heat Sink THM6071B
Heat Sink THM6072B
Screw, 6/32 x 3/8
Nut, 6/32
Transformer PITB-109 22VCT @300 MA
Jack, Keystone 901, Submini phono
Connector, DB-25, RS-232C
Berg Strip 9 x 2 (see SW2 above)
Berg Strip 3 x 2
Berg Jumper (qty 2)
Case top
Case bottom
Case screws (2)
Standoff, (qty 4)
Screw, #4 x 3/4, self-tapping (qty 4)
Knob, volume control
Label (FCC/ID)
Face decal (MicroVox)
Misc wire
Front Plate
Back Plate
Grommet

Sockets

8 Pin solder (1)
14 Pin solder (6)
16 Pin solder (4)
22 Pin solder (1)
24 Pin solder (3)
28 Pin solder (2)
40 Pin solder (2)


CRYSTAL
4.9152MHz
R16
1.8K
R15
1.8K
R14
33K
IC7
74LS04
7a
7d
NOTES:
LETTERS INSIDE CONNECTORS INDICATE CONNECTION TO THE SAME LETTER CONNECTOR IN FIGURE 3b.
BPS=BITS PER SECOND
SEE TEXT FOR EXPLANATION OF JUMPER AND SWITCH SETTINGS
SW2
DATA-RATE SELECT
CLOCK
CLR
IC6
CD4040
Q12
Q11
Q10
Q9
Q8
Q7
Q6
Q5
Q4
Q3
Q2
JP1
75 BPS
150 BPS
300 BPS
600 BPS
1200 BPS
2400 BPS
4800 BPS
9600 BPS
19200 BPS
JP2
0.61MHz
1.22MHz
JP3
G
1.22MHz
DATA-RATE CLOCK
A
ϕ0
B
R/W
C
RD
D
ϕ2
E
WR
F
8c
8d
8b
8a
IC8
7400
+5V
VCC
IC1
6502
R/W
ϕ2
ϕ1
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
A2
A3
A4
A5
A6
A7
A8
A9
A10
A11
A12
A13
A14
A15
NMI
RDY
IRQ
RES
VSS
SO
VSS
IRQ
L
+5V
D1
1N4148
R13
4.7K
C8
10μF
7b
7c
IC7
74LS04
M
RES
N
RES
NOTE:
ASTERISKS INDICATE INTEGRATED CIRCUITS WHERE 0.1μF DECOUPLING CAPACITORS SHOULD BE ADDED.
IC2
2016
IC3
2016
WE
OE
CS
IC9a
74LS139
IC9b
74LS139
SEL0
SEL1
SEL2
SEL3
SEL4
SEL5
SEL6
SEL7
H
I
J
K
SEL - ADDR
0 - 0000
1 - 0800
2 - 1000
3 - 1800
4 - 8000
5 - A000
6 - C000
7 - E000
IC4
27XX
16/32/64
IC5
27XX
16/32/64
A11/VPP
OE
VPP'
JP4
JP5
TO FIGURE
* = 2764 ONLY


NOTE:
LETTER INSIDE CONNECTORS INDICATE CONNECTION TO THE SAME LETTER CONNECTOR IN FIGURE 3a
FROM FIGURE 3a
IC10 6850
IC11 8255
IC12 SC-01A
IC13 74LS175
IC14a 74LS74
IC14b 74LS74
IC15 LM386
IC16 7407
IC17 MC1488
IC18 MC1489
IC19 7497
SW1 ATTRIBUTE SETPOINTS (SEE TEXT)
1.22MHz
RS-232C SERIAL PORT
PARALLEL INPUT PORT
8Ω SPEAKER
VOLUME


TO POWER SWITCH
R19
+ 12V
Z1
1
V1
7805
2
+ 5V
3
PITB-109
Wht or Grn
AC
+
D2
C20
C21
R21
C18
115 VAC
Red
LED1
AC
-
Blk
GND
C19
Z2
C22
R20
- 12V

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WARRANTY

A factory manufactured MICROVOX carries a 90 day warranty including parts and labor. No credit will be given for units which show damage through neglect or user modification. Any unit returned for repair after the warranty period must receive prior authorization and be shipped prepaid and insured. There is a minimum inspection fee for boards not under warranty. Under no circumstances is any product to be returned to The MICROMINT INC without prior authorization. The MICROMINT INC will assume no responsibility for unauthorized returns.

The MICROMINT INC extends no warranty on user assembled systems or kits. However, the MICROMINT INC will inspect and repair any assembled kits at a rate of $35 per hour (minimum charge 1 hour prepaid with returned merchandise). Return for inspection and testing must be authorized in advance by the MICROMINT INC.

The MICROMINT INC reserves the right to change any specification or feature at any time.

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